Richard P. Shannon, MD

Invited Testimony

United States House of Representatives
Committee on Energy and Commerce
Subcommittee on Oversight and Investigations

The Honorable Ed Whitfield, Chairman

March 29, 2006

Summary

Hospital Acquired Infections: The Conspiracy of Error and Waste in Healthcare

1. Hospital acquired infections in general and central line infections (CLABs) and ventilator-associated pneumonias (VAP) in particular are not inevitable consequences of complex healthcare but are indicative of unreliable processes and perverse economic incentives.

2. These infections and their consequences can be reduced through work standardization and commitment to safety as a precondition of caring for patients.

3. The costs of these preventable infections in both human and economic terms are staggering and largely unappreciated by both payers and hospitals.

4. Preventing these infections could free up limited resources now wasted in their care.

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Mr. Chairman and Members of the Committee:

It is an honor to be asked to testify before this distinguished body on a matter of vital national interest. You are undoubtedly aware of the litany of statistics from the Institute of Medicine and Centers for Disease Control defining the national epidemic of hospital acquired infections and you have heard specifically about the magnitude of the problem in the Commonwealth of Pennsylvania. I will not reiterate these findings. The fact remains that these numbers are so staggering as to be almost imponderable, suggesting that the problem is complex and insolvable.

Rather, it is my goal today to convince you that error and harm in healthcare is not inevitable, but a product of unreliable processes and misaligned incentives that reward activity not outcome. I will demonstrate using our own work that public reporting is not only accurate and informative, but establishes the basis for action. I will then show

you that at an individual hospital level, hospital acquired infections in general and central line infections and ventilator associated pneumonias in particular cost our hospital and others like it millions of dollars and hundreds of human lives, illustrating the conspiracy of error and waste prevalent in healthcare.

The work that I will present was performed at Allegheny General Hospital, a large academic medical center located in Pittsburgh's inner city. We are a major teaching affiliate of the Drexel University College of Medicine, a mentor hospital of the Institute for Healthcare Improvement and a founding member of the Pittsburgh Regional Healthcare Initiative, a regional collaborative established by former Treasury Secretary Paul O'Neill and Karen Feinstein PhD.

The Theory of Inevitability

A major challenge to the integrity of public reporting is the notion that hospital-acquired infections are an inevitable consequence of complex care and therefore an acceptable form of collateral damage in a daily battle against human disease. The notion of inevitability has its genesis in the fact that when infections occur, the root cause is not determined immediately. Three or more months after the fact when the infection is finally reported, the cause of the infection is not apparent, leading to the conclusion that it must be inevitable. Yet, there is no biological basis or genetic mutation that predisposes to hospital-acquired infections, although there are recognized conditions that pose a greater risk.

A major barrier in addressing the issue of hospital-acquired infections is the fact that we shroud the problem in epidemiological metrics that obscure the human face,

thereby mitigating the harm. As an example, in work from our Medical Intensive Care Unit and Coronary Care Unit, we were reporting average infections rates of 5.1 infections per 1,000 line-days. But how many human beings did that represent? Five? Ten? Fifty? When the data were presented in such an obscure fashion, we, and I venture to say most healthcare professionals, were unaware of the tragic human consequences or our own involvement in the events. As a result, it is then easy to dismiss these common occurrences as "unavoidable or inevitable". Until recently, the best we could do was benchmark against available "norms" such as the National Nosocomial Infection Surveillance data, generating a list of what has become known in safety circles as "the cream of the crap". We now believe that with respect to harmful conditions in healthcare, the only acceptable benchmark is the pursuit of the theoretical limit. Simply stated: zero infections. The unambiguous goal of zero…that no one should contract an infection in the hospital that they did not have when they arrived …obviates the need for any complex metrics. The Pennsylvania Healthcare Cost Containment Council should be commended for reporting the actual number of infections in just such an unambiguous fashion.

The argument that normalization of data is necessary to compare hospitals of different size and types simply focuses attention on the wrong set of comparisons. The correct approach is for each hospital to demonstrate consistent progress toward the theoretical limit. To those that argue that their patients are sicker, I say then all the more reason to perfect your processes as no critically ill patient gets better with a superimposed hospital acquired infection.

I would like to challenge the notion that hospital-acquired infections are inevitable by demonstrating that it does not have to be this way. Over the course of the

last 32 months, we have dedicated ourselves to the proposition that we can eliminate hospital acquired infections through work redesign borrowing from the lessons of Toyota and Alcoa, industry leaders in producing reliable products. The principals of Perfecting Patient Care™ are an adaptation of the industrial methods employed by the Toyota Production System and the Alcoa Business System, but designed for healthcare and taught in a 5-day course developed and sponsored by Pittsburgh Regional Healthcare Initiative. I will not focus on those processes here to but rather refer you to the PRHI website (www.prhi.org) where the process is outlined in greater detail.

Figure 1 illustrates the progress toward the eradication of central line infections. We have reduced the number of central line infections progressively from 49 to 3, deaths associated with these infections from 19 to 1 and improved the safety and reliability of the process from 1 infection in every 23 lines placed to 1 in every 535 lines placed as of the end of February, 2006. We have not had a central line infection in these two critical care areas since August 14,2005. The progress to zero has occurred despite a near doubling in the use of catheters and a steady increase in the severity of illness of patients in our ICUs. Stated differently, using more catheters and caring for sicker patients are not justifications for higher numbers of infections.

Do Hospitals Make Money on Central Line Infections?

Needless to say, when you define hospital-acquired infections as inevitable, you also create the rationale for paying for them. But little is known as to whether hospitals make or lose money when care is complicated by hospital-acquired infections. Therefore,

understanding the economy of hospital-acquired infections is essential to changing the culture.

To explore this issue we examined the payments and expenses associated with 54 central line infections in our two ICUs over three years. In our work, each economic analysis begins with an understanding of exactly how the error occurred and specifically how it affected the patient (**Figure 2**).

A thirty-nine year old video programmer, father of four was admitted with acute inflammation of the pancreas due to elevated plasma triglycerides. On the third hospital day, he developed hypotension and metabolic acidosis related to pancreatic inflammation and required pressor support and mechanical ventilation. On day 6, he developed fever and recurrent hypotension. Blood cultures were positive for methacillin resistant staphylococcus aureus and the same organism grew from his femoral venous catheter that was placed four days previously. He developed multiple complications from the catheter related bacterial sepsis including intra-abdominal abscesses requiring multiple laproscopic drainage procedures and renal failure requiring dialysis. The prolonged course required that he undergo tracheotomy to facilitate ongoing requirements for mechanical ventilation. Finally, after 86 days in the hospital, he was transferred to an acute long-term care facility for further rehabilitation.

Now, I do not share this with you because I am proud of it, but rather, to illustrate the human face and the actual harm that can accompany these infections. Health care workers are not motivated by epidemiological metrics such 5 infections /1000 day days, but they renounce the current condition when the magnitude of the error is expressed in its human dimensions and when they come to believe that there is something that they

can do about it. The consequences to the patient are considerable and a sufficient cause for action, but what are the economic implications?

In **Figure 3**, we see that Allegheny General Hospital received $200,765 in payments for the care rendered; yet the hospital costs were $241,844, such that the loss from operations was -$41, 813 on this single case. Notably, the additional care provided as a result of the preventable central line infection and its associated complications amounted to $170,565 or nearly 71% of the total cost of care with an 86-day hospitalization. Now, I want to emphasize that these are actual hospital costs, not charges that were actually billed as $828,847!

In addition, I want to share three comparisons with our case as illustrated in **Figure 3**. In the first example, you see the economics from the hospital's perspective for providing good basic care to three other patients that presented with the same diagnosis. When we do it right, the payment is much less ($5,907), the costs are much less, but so too is the hospital margin (+ $119).

Arguably, our patient had a more severe case of pancreatitis due to the initial hypotension and presence of partial pancreatic obstruction. In the second illustration, you see the common finding that our hospital is well paid ($99,214) for providing an advanced level of care, particularly surgical care, in such a complex case, with an operating margin of + $40,309.

A third comparison is made with two other patients who developed severe pancreatitis, required prolonged mechanical ventilation, and eventually underwent tracheotomy, similar to our patient. Again, our hospital was well paid ($125,576) when

complex care results in a less than optimal outcome, although the margin is less (+$27,482) than that seen with complex surgical care alone.

Yet, in the case of our 39 year-old patient, when complex care is further complicated by a central line infection, the economics turn sharply negative for our hospital with an operating margin of -$41,813.

Now this is all from the hospital's perspective. These costs do not include payments to physicians and for long term care or for the patient's need for ongoing dialysis or the loss of a productive laborer in the workforce. But, let me highlight for you what society pays for these various levels of care. The payment increases progressively as care becomes both complex and complicated from $5,907 to $200,031, yet the patient's outcome is inversely proportional to the payment.

In summary, I have illustrated in **Figure 4** the economic impact on hospital operating margins of 54 central lines infections that we examined from our two ICU's. The average payments was $64,894, yet the average costs were $91,733 such that the hospital had a negative gross margin of $26,839 per infection and a total negative gross margin of $1,449,306. The average payment for a central line infection in my two ICUs is a number that is remarkably close to what has been reported by PHC4 in the Commonwealth of Pennsylvania.

In **Figure 5**, I provide a similar summary of the economic and clinical impact of 99 ventilator associated pneumonia (VAP) cases in the same two ICUs over 3 years. The average payment was $62,883, but the costs were $87,318, such that the average loss from operations was -$24,435 per case, totally a three-year loss of $2,419,065. The payments in cases of ventilator-associated pneumonias were twice those in comparable

cases ($33,569) uncomplicated by this preventable hospital acquired infection. With a similar approach using the principals of Perfecting Patient Care™, we reduced the number of ventilator-associated pneumonias from 45 to 8.

Finally, I would like to highlight the economic benefits to our hospital as a result of nearly eliminating two classes of HAI over the last two years, illustrated in **Figure 6**. The work has resulted in operational improvements of +$2,238,927 and an additional $2,100,000 in incentive payments totaling $4,338,927 in improvements. We invested a total of $34,927 over two years to achieve the result. In the process, we have increased the number of admissions to the ICUs by 126 and saved 47 lives. Thus, our hospital has incurred substantial losses when care was complicated by a hospital-acquired infection. On the other hand, both our patients and we have benefited by efforts to eradicate these insidious infections.

Mr. Chairman and distinguished Members of the Committee,

The greatest and certainly most expensive healthcare system in the world is teetering on the brink of a financial crisis and is an unbearable drag on the nation's economy. The unreliable systems of care delivery and the unsafe conditions that are created as a result undermine the promise of new technology and threaten our ability to afford it. The value added from the elimination of hospital-acquired infections is more than sufficient to provide insurance for the growing number of uninsured and working Americans as well as to give us a down payment on the promising new technologies that offer real hope for eradicating disease. Before us lies the first and most important challenge to realize these goals. Are we as informed citizens and as an honorable profession willing to commit

together to eliminate the harm and the waste associated with preventable hospital acquired infections?

Thank you